

**MCE** McCLELLAND  
CONSULTING  
DESIGNED TO SERVE ENGINEERS, INC.

1810 N. College Ave. • Fayetteville, AR 72703 • 479-443-2377

To:

David D Rockhill, CPM  
c/o City Clerk's Office  
110 W. Maddux, Suite 205  
Branson, MO 65616

Statement of Qualifications  
Proposal Number 2493-25  
Due 6/25/19 by 3 pm

RECEIVED

JUN 25 2019

BY: 11:37 AM

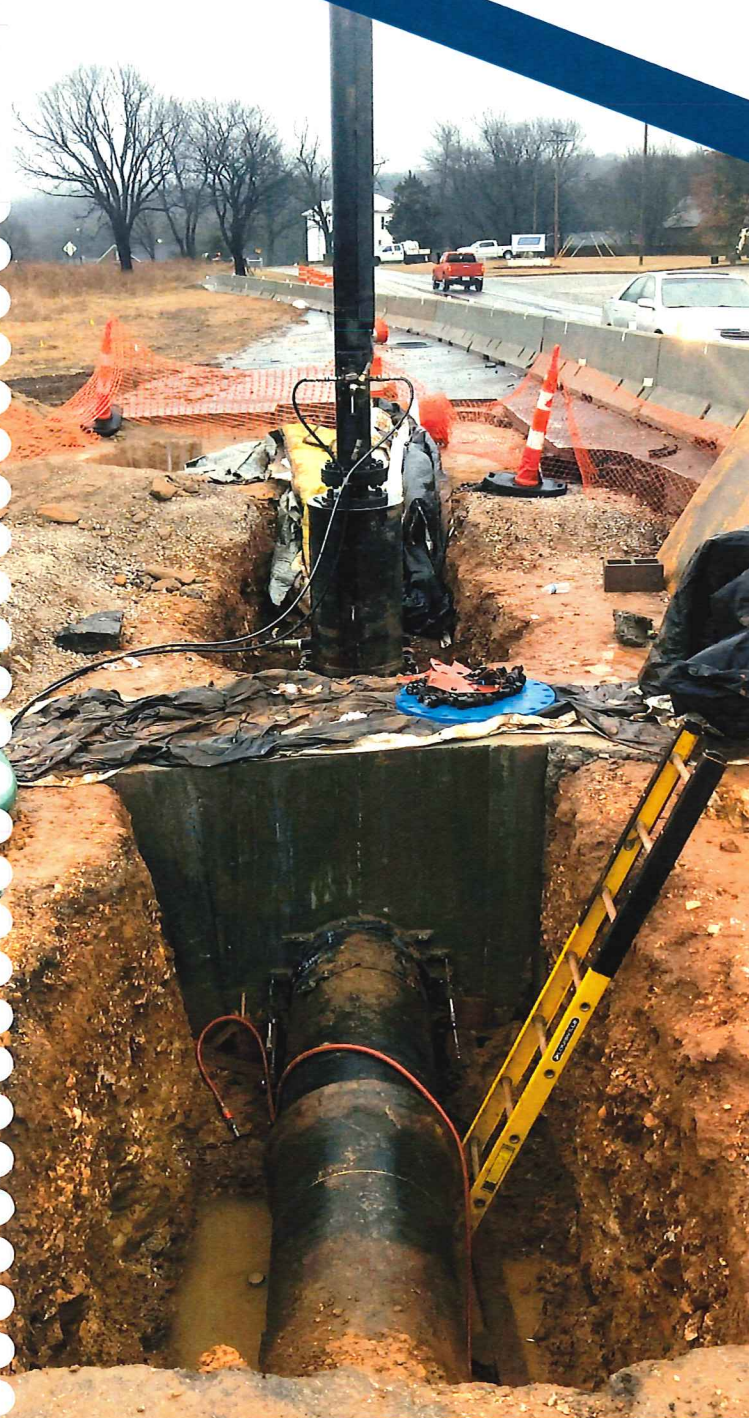




June 25, 2019

City of Branson

**STATEMENT OF QUALIFICATIONS  
FOR ENGINEERING & DESIGN  
SERVICES  
PROPOSAL NUMBER 2493-25**









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[mce.us.com](http://mce.us.com)

June 25, 2019

David D. Rockhill, CPM  
City of Branson  
Purchasing Office  
110 W. Maddux Street, Suite 200  
Branson, MO 65616

RE: Proposal Number 2493-25, for Engineering & Design Services

Dear Mr. Rockhill,

McClelland Consulting Engineers, Inc. wishes to express our interest in providing professional engineering services to the City of Branson for your upcoming water/wastewater related projects, as referenced in RFQ Number 2493-25.

MCE, established in 1963, is a multidisciplined civil engineering firm offering a broad range of professional services. As a company ***Designed to Serve***, MCE is dedicated to providing a level of commitment that exceeds client expectations in achieving successful project completion on time and within budget. With more than 50 years of experience in the water and natural resources sectors, MCE has the history and expertise to provide innovative and cost-effective solutions to address your water and/or wastewater needs. Our abilities range from addressing the water resource and sanitary sewer needs of growing populations, to design and rehabilitation of pipelines and other infrastructure. We provide a full suite of integrated water and wastewater engineering and construction services from the planning phase through to start-up of water/wastewater treatment facilities, as well as facility upgrades. With this experience, we bring knowledge of new regulations, technologies and funding, and are committed to improving and designing collection, distribution, and treatment systems that meet standards established by state and federal regulatory agencies and maintain in-stream water quality.

Thank you for the opportunity to provide our qualifications. We consider it a privilege to have served the City of Branson on the recently completed Sunset Road Lift Station project, and we look forward to partnering with you again on these upcoming water/wastewater projects. Should you have any questions or require a meeting to discuss our capabilities, we will be available at your convenience.

Sincerely,

McClelland Consulting Engineers, Inc.

Daniel Barnes  
President, MCE-Fayetteville  
[dbarnes@mce.us.com](mailto:dbarnes@mce.us.com)  
(479) 443.2377

Nick Batker, PE, CFM  
Sr. Project Manager/Associate  
[nbatker@mce.us.com](mailto:nbatker@mce.us.com)  
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## RELEVANT EXPERIENCE

MCE has been assisting municipalities and regional water suppliers with planning and designing public water supplies for more than five decades. We fully understand the critical role that adequate potable water facilities/supplies play in economic development and growth within communities. In our 50-plus years, MCE has acquired considerable experience in the design and construction administration of water distribution and sanitary sewer collection projects of all shapes and sizes. The following is a partial list of our relevant experience.

### West Fork Acres & Wastewater Transmission Line



The City of West Fork owns and operates a wastewater treatment plant that was constructed in 1973 and was designed to treat 100,000 gallons per day, and to meet discharge limits as established at that time. Due to growth in the City and more stringent discharge limits in the White River watershed, the wastewater treatment plant is unable to meet discharge requirements and an alternate solution for handling the City's wastewater was required. This project is being funded through the ANRC Revolving Loan Fund program.

MCE completed an SSES of the City's system in 2015, which found that the City was having large scale infiltration and inflow problems within its system. As a result, design plans and specifications were prepared to rehabilitate the system. Construction began in August 2016 and was completed in August 2017 at a cost of \$1.4 million. The project included rehabilitation/replacement of more than 200 manholes and the replacement of approximately 7,000 feet of sewer mains.

As a result, infiltration and inflow in the existing sewer system was drastically reduced and actual sewer flows into the City's treatment plant could then be determined. Based on a cost analysis, it was determined that the most beneficial option for West Fork was to abandon its plant operations and seek regional treatment, and so the City recently secured an additional \$8.4 million RLF funding package to design and construct a sewer connection from West Fork to Fayetteville's sewer system. The project consists of 2.6 miles of 15-inch gravity sewer, 4.5 miles of 10-inch force main, and a 1.5 MGD lift station. West Fork's existing treatment plant will be decommissioned once the new system is placed into operation. MCE is responsible for alternative analysis, environmental coordination, surveying, easements, design, permitting, and construction observation. Design is approximately 100% complete. We are currently awaiting regulatory approval and finalizing easement acquisition. Construction is anticipated to begin in the fall of 2019.



### Bentonville South Force Main & Pump Station



South pump station prior to upgrades

MCE designed upgrades to the south force main and pump station owned by the City of Bentonville. This project replaced the existing 10-inch force main that flows north with approximately 15,000 linear feet of new 16-inch PVC force main that flows west into a gravity system that has the necessary capacity to handle the increased flows. In addition, the existing pumps and valves

within the lift station were replaced with new pumps and valves. The scope of services on this project included horizontal alignment plans, vertical alignment plans, roadway sections, earthwork, drainage design, driveway and street intersection design, paving and drainage details, project specifications and bid documents, coordination with ARDOT, utility design as necessary, and bidding assistance. Construction was completed in November 2015.

### Ozark Acres and Johnson Avenue Water Lines



MCE assisted the city of Cave Springs in the design and construction of two water lines that serve residential areas. The Ozark Acres water line consists of approximately 6,700 linear feet of eight-inch PVC water line to serve a subdivision that previously did not have a potable water system. The Johnson Avenue water line consists of approximately 2,900 linear feet of six-inch PVC water line between Hwy. 112 and Clayton Road, which replaced an existing four-inch water line. The project includes: new fire hydrants,

service lines, water meters, and connections to existing water lines.

The design for this project was completed in March 2016, and construction was completed in late 2016. MCE also provided construction observation services through the project's completion.



### Wooster Water System Improvements

During times of peak demand, the City of Wooster was experiencing inadequate pressure and flow within several areas of higher elevation in their water distribution system. MCE was asked to provide a water system report and hydraulic models for the system. The original system was comprised of three stand pipe tanks (50-, 100-, and 500-thousand-gallons) and water lines in various widths of two- to eight-inches with the main supply line being four-inch to six-inch. Due to the lack of adequate height on one of the tanks, the pressure in the line did not allow the tank to empty into the system.

MCE then assisted the City of Wooster in obtaining funding through the Arkansas Natural Resources Commission in the amount of \$2,530,000.

The top priorities within the system were addressed in Phase I. In order to alleviate the city's low flow and pressure issues, MCE recommend the installation of a second master meter which allows for increased pressure in the southern portion of the city and adds redundancy in case of a failure at the current feed from Community Water System. From the new master meter, a new 21,000 foot, eight-inch, PVC water line was designed running west where it ties into an existing system. Additionally, a new 250,000-gallon, elevated tank was constructed to replace an existing 100,000-gallon standpipe. This tank allows for greater storage volume to serve water users during times of peak demand. The new tank has overflow elevation 52 feet higher than the previous standpipe providing an increase in water pressure in the area.

Phase II is currently under construction. A third phase was also recently added to this project, per the City's request, to add chlorine equipment to the existing master meter building (constructed in Phase I). The plans for the third phase are currently under review by the health department, and will be constructed later this year.

### Simmons Foods Facility Force Main

MCE is assisting the City of Decatur with the design of a sanitary sewer force main to extend from Simmons Foods' new processing facility to the City's wastewater treatment plant. The project is being funded through an AEDC grant obtained by Simmons Foods. The force main is 16-inch HDPE SDR-11 and extends approximately 4.2 miles in total length. HDPE was selected for this project primarily for its corrosion resistance. However, it was also realized the design process that it performed well in surge pressure analysis due to its low Modulus of Elasticity, as compared to PVC or ductile iron. Secondary advantages of HDPE pipe include its flexibility, elasticity, and abrasion resistance.

MCE's scope of work included alignment analysis/selection, topography and boundary surveying, easement document preparation, environmental coordination, geotechnical investigations, hydraulic/surge analysis, design, and permitting (with railroad, ARDOT, the county and USACE). The design included a dissipation box at the end of the force main in order to reduce flow velocities prior to entering the City's gravity sewer system.

Construction began in March 2019 and is on a fast track schedule in order to meet the requirements for the start-up of the new Simmons Foods facility. MCE is also providing construction observation services for the City. The project will be substantially complete in July 2019.



## RELEVANT EXPERIENCE — RESUMES

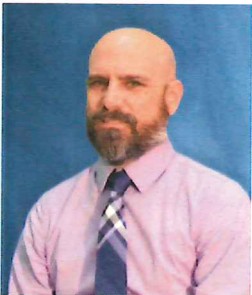
### **Daniel Barnes, PE | President, Project Director | MO License #2017026108**



Mr. Barnes is the president of MCE-Fayetteville. In this position, he is responsible for the overall management of a wide variety of the office's ongoing public works projects. This entails contracting, scheduling, budgeting and expediting the engineering, surveying and laboratory project aspects of these assignments. In addition to his management duties, Mr. Barnes has several years' experience in hands-on planning, design and construction administration. Among the projects with which Mr. Barnes has been involved are for water distribution and wastewater collection and conveyance.

Mr. Barnes was a critical team member for the Sunset Road Pump Station project in Branson, as well as the Ozark Acres/Johnson Avenue project in Cave Springs. He is experienced in providing quality projects in a confined environment as well as having dealt with areas with rock, traffic and those that must have public input.

### **Nick Batker, PE, CFM | Project Manager | MO License #2015026301**



Mr. Batker manages the Water/Wastewater Department for MCE-Fayetteville. He brings more than 20 years of experience in the planning, design and construction administration of infrastructure projects. Mr. Batker's experience includes water distribution, pumping and storage facilities, and wastewater collection, pumping and treatment facilities.

Mr. Batker played a key role on the Bentonville Force Main project and the Ozark Acres/Johnson Avenue water lines project. He is currently serving as the project manager on the West Fork Transmission Line and Simmons Facility Force Main projects. Mr. Batker is well-versed in coordinating multidisciplined teams to deliver projects on a fast track schedule.

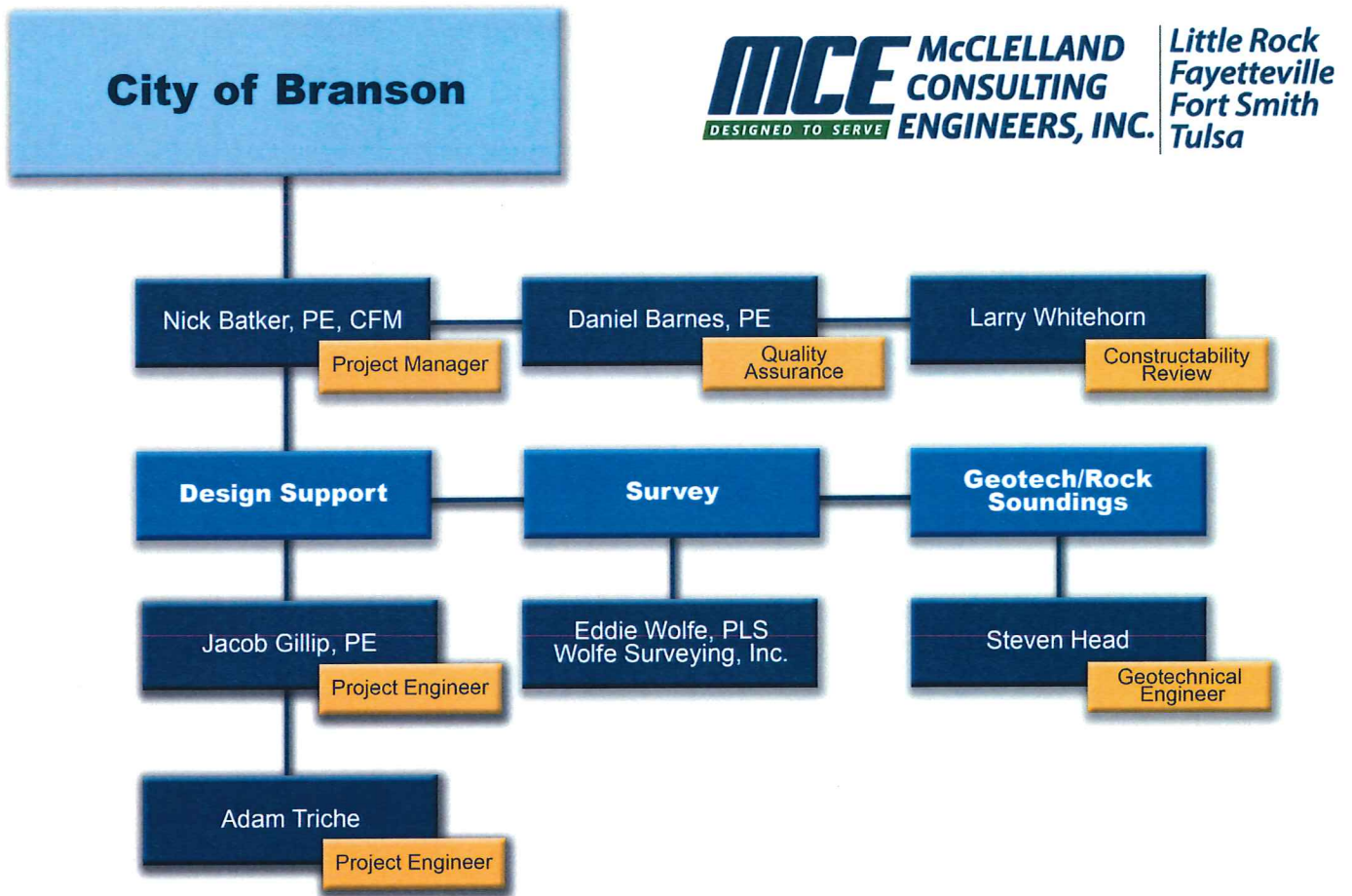
### **Jacob Gillip, PE | Water/Wastewater Engineer | MO License #2015003012**



Mr. Gillip is a project manager and an associate at MCE. He is very passionate about finding cost-effective solutions to client needs. He is familiar with the process of identifying the challenge, preparing and/or evaluating hydraulic models, developing multiple solutions/associated costs, and evaluating funding options to finalize the solution. His experience goes beyond planning and design, and includes construction administration.

Mr. Gillip has played an essential role in the Simmons Facility Force Main project. He has extensive experience working water distribution lines, sewer collection systems, and utility relocations. He has designed or rehabilitated a total of seven tanks.

## RELEVANT EXPERIENCE — ORGANIZATIONAL CHART





## PROPOSED SCHEDULE

Below you will find an estimated schedule to complete all three projects for the City of Branson. Several assumptions were made to develop this schedule. This is a preliminary estimate of time allotted and could be reduced if necessary to accommodate the needs of the City.

Item	Date
Request for Proposal Due	6/25/19
Scoping meeting with City	8/12/19
Submit contract for review	9/6/19
Contract approval by Board of Alderman	9/24/19
Notice to Proceed issued	9/25/19
Kick off Meeting with City	9/30/19
30% Design Complete	12/20/19
Public Input Meeting	1/15/20
60% Design Complete	2/14/20
90% Design Complete	3/20/20
100% Design Complete	4/10/20

## PAST PROJECTS ON BUDGET

At MCE, we believe that thorough designs allow us to track and control project budgets. However, in addition to providing our clients with thoughtful designs, we also utilize proprietary software like Smartsheet, a cloud-based work management tool, that we utilize to track individual project schedules and costs, as well as management of resources. Below you will find five projects that detail the engineer's estimate and final construction costs.

Project Name	Engineer's Estimate	Construction Cost
West Fork Acres	\$1,350,000*	\$1,426,505*
Bentonville South Force Main	\$1,900,000 **	\$2,213,900.47**
Ozark Acres/Johnson Avenue	\$550,000	\$473,274.36
Wooster Water System	\$1,300,000	\$1,377,124
Simmons Facility Force Main	\$3,000,000***	Final TBD***

\* Overruns were due to additional rehabilitation items requested by the owner during construction utilizing the unit prices established in the contract.

\*\* The Bentonville South Force Main project exceeded the engineer's estimate due to owner requested changes such as relocation of planned route to accommodate land owner and additional scope to replace items below grade that had deteriorated.

\*\*\* The project is under construction with a target substantial completion date of July 2019.



## QUALITY ASSURANCE/QUALITY CONTROL

Throughout this process, MCE will maintain regular communication with the City of Branson and its officials to keep the City informed and to address any concerns that may arise. As the project progresses, quality control and quality assurance will be implemented as standard practices of the MCE design team. Below you will find our standard QA/QC processes by department:

### PREDESIGN/SCOPING MEETING WITH CLIENT

The project manager is required to review the scope in detail with the client to ensure all aspects of services to be provided are covered and agreed upon by both parties.

### SURVEY

- Project managers/engineers hold in-house meetings with Survey Department prior to collection of field data. The pre-survey meeting covers design parameters, survey tolerances, the scope of the project and deliverables.
- The survey technician responsible for drafting will field verify the survey upon completion to ensure all field work was translated properly to the final survey.
- Once complete, the final survey is saved in the survey directory where only the survey department can make changes. Designers are not allowed to make any adjustments to the survey.
- Weekly staff meetings are held to discuss staffing and ongoing projects. Any challenges and solutions experienced the previous week are discussed to ensure we never stop learning.

### DESIGN

- Projects are assigned to one project manager that coordinates the design and all design support from other departments such as geotechnical, survey and any outside support.
- Internal predesign meetings are held with staff to discuss the scope, individual responsibilities, timeline and deliverables of each project.
- The PM is responsible for completing or assigning staff to complete engineering

design reviews for designs for each milestone submittal.

- The design is value engineered at each submittal stage to evaluate added value or potential cost savings.

### CONSTRUCTION

- Project manager/engineers hold in-house meetings with construction staff or our clients if they are managing construction, prior to beginning construction to review the drawings and scope of services. Every project has a few unique challenges that are faced during the design and this information is conveyed to the construction staff at this time. Any permit requirements required by funding and or regulatory agencies are additionally reviewed.
- Project managers/project engineers conduct a thorough review of the submittals to ensure they meet the design requirements.
- Our construction observation staff is part of our geotechnical department and they maintain appropriate certifications for soils, asphalt and concrete testing. Maintaining Experienced construction observers are a strong part of our quality assurance program.
- We plan our site visits just before/during the progress of major construction tasks to review work for plan compliance which minimizes corrective work.
- Erosion control measures are monitored to ensure they are maintained for the duration of construction to minimize risk to neighboring properties.
- Daily logs are generated for each site visit on iPads and transmitted to the cloud for City access, if needed. These construction reports document project conditions, activities and the progress of work during that visit.
- Construction materials tests are reviewed for quality assurance, corrective actions are identified and recommended for any failing test.
- We require a project engineer and construction observer to attend any/all startup operations to ensure equipment is tested to meet future demands as outlined in the design and



## PROJECT APPROACH/UNDERSTANDING

specifications.



Lift Station 17

### PROPOSED LIFT STATION 17 FORCE MAIN

Lift Station 17 is a booster station that is located at the end of Thelma Doyle Road. The existing force main is approximately 3,600 feet and discharges to an existing manhole located at the northeast corner of the intersection of Blue Meadows Road and Dakota Road. The first 350 feet of the force main is 18-inch ductile iron pipe. The force main then reduces to a 12-inch PVC pipe. Failures have been experienced over the last several years with the PVC segment of the existing force main. It is our understanding that the failures are related to backfill that includes larger rock in the pipe zone, which has resulted in excessive point loading on the pressurized line. Time and excessive point loading have resulted in several localized failures that are not only costly to repair, but require shutdown of the system and significant clean-up.



Rock outcroppings along South Falls Avenue

After a field review of the desired route as shown in Exhibit A of the RFP, we agree this is the best placement. The existing force main must stay in operation during the installation, and due to the nature of the existing force main failures, it is not recommended that the new force main be installed adjacent to it. It must also be noted that the desired route comes with its own challenges. During our site review we noted the following challenges:

- Rock outcroppings along South Falls Avenue. It appears as if this will require installation in the street and force us to complete with the existing storm drainage and other underground utilities.
- Existing structures are located in close proximity to the proposed route. The structure's foundations are likely bearing on rock and we will need to record any visible damage to the structures prior to construction to be able to ensure the owners of the properties that our project did not cause any damage.
- Traffic control is always a challenge in Branson as the tourist season is almost year-round. The slowest months are January and February, and as we know, not the best time to construct capital improvements. Close coordination with the property owners should happen during the design so expectations can be managed accordingly during the construction phase.

### PRELIMINARY DESIGN DEVELOPMENT PHASE

The preliminary design development phase is the most critical aspect of this project. It is very important that a full and complete evaluation of the potential route(s) are completed to minimize conflicts during the final design phase. This means that we intend to keep the city engaged during this entire process to ensure that all challenges are identified and solutions developed before beginning the design phase. Below you will find a list of tasks that will be performed to identify the best and most cost-



## PROJECT APPROACH/UNDERSTANDING

effective route for the force main:

- Evaluate other potential routes.
- Evaluate current and future sanitary sewer demands to determine the proper sizing of the force main.
- Evaluate potential pipe materials while taking into account ease of installation, cost of materials, water hammer, cyclical loading and future maintenance.
- Review and select air release valve supplier. Access and potential odor must be considered in the placement of the air release valves.
- Evaluate the impact a larger force main may have on Lift Station 17 and the downstream system.
- Obtain and review the land records along the alignment(s) that include existing utility easements
- Complete a field evaluation to determine type and location of existing utilities
- Coordinate with the electrical company to determine if we can utilize its easement along Blue Meadows Road to place our force main
- Determine the most feasible route for the project and develop a preliminary construction opinion of costs.

### FINAL DESIGN

The final design process will include completing the detailed design and construction documents after due diligence has been completed and we have all agreed on a route and solutions to identified challenges. The scope will be as follows:

#### TASK NO. 1 — TOPOGRAPHIC SURVEY

Perform topographical survey as required for design. The topographic survey will include all surface elevations, surface features and identified subsurface utilities.

#### TASK NO. 2 — BOUNDARY SURVEY

Perform a boundary survey of the parcel(s) needed for development of easements. At this

time, it appears as if much of the project can be constructed in city right-of-way and on existing utility easements.

#### TASK NO. 3 — EASEMENT PREPARATION

Prepare legal descriptions and exhibits for land acquisition, right-of-way, and/or easements.



#### TASK NO. 4 — GEOTECHNICAL ENGINEERING

Perform rock soundings along the identified route and incorporate the drill logs with locations into the bid documents to quantify the amount of rock excavation.

#### TASK NO. 5 — DESIGN

Complete the detailed design and specifications for the improvements. The design will be prepared in 30%, 60%, 90% and final increments.

- Prepare bid documents for one construction contract. The bid documents will include three separate bid schedules to accommodate the Lift Station 17 force main, Spring Creek neighborhood water distribution and the Spring Creek neighborhood sanitary sewer collection.
- Prepare a stormwater pollution prevention plan.
- Prepare a detailed estimate of probable construction costs for improvements.
- Submit plans and specifications to the Department of Natural Resources for review and approval.
- Prepare necessary permit applications for roadway utility crossings.
- Represent the Owner at meetings, as needed, pertaining to this project.
- Prepare addenda as needed during the



## PROJECT APPROACH/UNDERSTANDING

bidding process.

- Attend bid opening and prepare certified bid tabulation.
- Evaluate bids as received and recommend award of the Construction Contract based on the bid evaluation.

### TASK NO. 6 — SERVICES DURING CONSTRUCTION

- Attend preconstruction meeting.
- Review/Approve submittals.
- Answer construction related questions when needed.
- Attend the final inspection and prepare punch list.

### SPRING CREEK NEIGHBORHOOD WATER DISTRIBUTION/SANITARY SEWER COLLECTION

The Spring Creek neighborhood is located outside of the city limits of Branson on the west side of Spring Creek Road. Approximately 26 lots reside within this neighborhood on three dead end roads. Each receives water from the City of Branson through a master water meter. However, the water lines that serve the subdivision are not large enough to provide adequate fire protection or redundancy during a line break.

The neighborhood is also served by a substandard sewer system. The subdivision generally slopes from the northwest to southeast and the existing sanitary sewer follows this terrain and discharges in Spring Creek Road, just south of Hickory Drive.

After a field review of the desired route as shown in Exhibits B and C of the RFP, we agree this is generally the best placement and approach to install services that meet the current city design standards. Services must be maintained during the duration of both of these projects and close coordination with the homeowners in the area must begin during the preliminary design

development phase.

### PRELIMINARY DESIGN DEVELOPMENT PHASE

The preliminary design development phase is the most critical aspect of this project. It is very important that a full and complete evaluation of the site is executed in order to minimize conflicts during the final design phase. Below you will find a list of tasks that will be performed to identify the best and most cost-effective design for the project(s):

- Identify individual water services and sanitary sewer connections to each home/lot.
- Determine, to the best of our ability, the location/departments of existing infrastructure. It does not appear that natural gas is located in the area due to the number of propane tanks installed in the subdivision.
- Identify any obstacles to extending the water lines to complete looped connections and connecting sanitary sewer to the existing system.
- Host a public input session with the homeowners to discuss plans, options and timing for proposed improvements. This coordination will be needed to ensure proper placement of service lines.
- Develop a plan to relocate/replace private service lines if needed.
- Evaluate placement of a pressure reducing valve. It appears as if the neighborhood will be split into two separate pressure planes.

The final design will follow the same format as detailed above for the Lift Station 17 force main with a few exceptions. A more detailed boundary survey will need to be completed to ensure enough information is gathered to assist with the potential annexation of this area. Furthermore, paving of Lilac Drive, Park Drive and Hickory Drive need to be considered as this project will provide a large amount of disruption and could potentially assist with annexing the area.

## REFERENCES

1. Isaac Harderson  
City of West Fork, Public Works Director  
PO Box 339  
West Fork, AR 72774  
(479) 839.2342
2. Randall Noblett  
City of Cave Springs, Mayor  
PO Box 36  
Cave Springs, AR 72718  
(479) 248.1040
3. Lynn Hyke  
Water/Sewer Services Construction Mgr.,  
City of Fayetteville  
113 West Mountain Street  
Fayetteville, AR 72701  
(479) 718.7670
4. James Boston  
City of Decatur, Director of Public Works  
PO Box 247  
Decatur, AR 72722  
(479) 752.3912
5. Bobby Ennes  
Seven Valleys Construction  
PO Box 88  
Cassville, Missouri 65625  
(417) 847.2355

Our best references are the projects that we complete, and we are very proud of the successful projects that we have completed recently for the City of Branson, including the Sunset Road Pump Station project and the Wildwood Drive Transportation/Roundabout Study.

The Sunset Road Lift Station had reached the end of its economic life, and MCE was selected to rehabilitate lift station, which receives gravity wastewater flow and was the last one in the City of Branson to utilize a wetwell and drywell system. MCE assisted the City with the design for a safe and aesthetically pleasing lift station, as it is located in the area of Alexander Park. Safety considerations included the safety of the site for users of Alexander Park; the capability and safety of equipment to properly pump present and future flows; and the safety of the equipment and back-up generator to operate properly, should conditions occur in this low lying area.

The City opened bids on February 22, 2018 and the low bid was in the amount of \$463,730. Construction started in late summer of 2018 and was completed in the spring of 2019. The engineer's estimate for the project was \$500,000 and the actual completed construction cost was \$463,730.

Another project MCE completed for the City of Branson, prior to the Sunset Road Lift Station project, is the Wildwood Drive Transportation/Roundabout Study. MCE's transportation engineers looked into the feasibility and improved service of putting a roundabout at the intersections of Wildwood Drive and Gretna Road



### VALUE ENGINEERING PROCEDURES

Value engineering is an art and must continually be balanced during the entire design to maintain the highest efficiencies for the duration of the project. This approach provides our clients with a more efficient project that translates to time and cost savings.

During our initial review, we have identified several VE items to discuss and they are as follows:

### PROPOSED LIFT STATION 17 FORCE MAIN

- We propose to complete rock soundings along the selected routes and include rock depths on the plan and profile sheets. This will allow us to design the depths to accommodate the existing rock and reduce the risk on the general contractor which, in turn, should reduce the construction costs.
- We think HDPE should be considered during the preliminary design process. High-density Polyethylene has many advantages in force main applications. The primary advantage of HDPE in sanitary sewer force mains is its resistance to corrosion, both interior and exterior. This is especially useful in applications where the wastewater is unusually acidic or septic. It is also resistant to tuberculation, or other accumulations on the interior of the pipe, reducing long-term maintenances. Secondary advantages of HDPE pipe include its flexibility, elasticity, and abrasion resistance. Due to its flexibility, it can be bent to a tighter radius than PVC or ductile iron, which reduces fittings. It's elasticity allows it to handle surge pressures from pumps suddenly stopping or other flow disturbances. The abrasion resistance can come into play on both the inside and outside of the pipe in preventing damage to the pipe. On the Simmons Force Main project for the City of Decatur (Project in Related Experience Section), HDPE was selected primarily for its corrosion resistance. However, it was also realized during the design process that it performed well in surge pressure analysis due to its low Modulus of Elasticity, as compared to PVC or ductile iron.
- PVC could also be evaluated at higher elevations where surge pressures are lower.
- Existing pump operation will need to be evaluated when choosing the final size of the force main. Long term operational costs will be evaluated during this process.
- Document existing structures near any rock excavation for existing damage prior to beginning construction.
- Host a public input session to discuss the project and associated time lines to minimize disruptions to existing properties and their guests. Develop a Statement of Procedure to notify property owners if a water line or other utility is damaged during construction. This should be shared at the public input session.

### SPRING CREEK NEIGHBORHOOD WATER DISTRIBUTION/SANITARY SEWER COLLECTION

- Homeowner coordination will be the most important aspect of this project. Identification of existing service entrances/exits to each home must be identified prior to completing the preliminary design. If clean outs are installed and assessable, time will be taken to determine service line inverts to minimize depths of the sanitary sewer collection system to be installed.
- Neighboring properties that are currently unserved will need to be considered during the design. Vertical and horizontal alignments for the sanitary sewer will be set to accommodate areas of future growth.
- Host a public input session to gather as much information about the existing utilities as possible and to update the homeowners on the current project and timeline. It is important to communicate with them early and often as the potential exists for several service interruptions due to the limited knowledge of utility locations.
- Develop a Statement of Procedure to notify property owners if a water line or other utility is damaged during construction. This should be shared at the public input session.
- Document existing structures near any rock excavation for existing damage prior to beginning construction.